US Air Force
And
Civilian

MIDAIR COLLISION AVOIDANCE (MACA) HANDBOOK

Jan 2004

THE INFORMATION CONTAINED IN THIS HANDBOOK IS SUBJECT TO CHANGE, AND IS NOT TO BE USED FOR NAVIGATIONAL PURPOSES. CONSULT CURRENT FLIGHT PLANNING DOCUMENTS FOR THE LATEST INFORMATION.

58 SOW Flight Safety MACA Program
Kirtland Air Force Base, Albuquerque NM

MIDAIR COLLISION AVOIDANCE (MACA)

Military flight operations are unique because the type aircraft, operating areas, flight environment and the times flown are different from any others. As a result, the more you know regarding military flight operations, and the more you apply that knowledge, the greater your chances of avoiding a midair collision or near midair collision with a military aircraft.

This pamphlet can provide you with a solid foundation of knowledge regarding flight operations of the different aircraft based at Kirtland Air Force Base. Although the information you'll read here is specific to assigned aircraft and their activities, the principles apply to any area where military aviators operate.

The information contained in this pamphlet summarizes the type aircraft, operating areas, and missions flown by the 58th Special Operations Wing (SOW) and 150th Fighter Wing (FW) based at Kirtland AFB. It also summarizes available radar services and provides tips to help you see and avoid others who share the sky.

This pamphlet is provided free of charge as a service to aviation safety enthusiasts and the general aviation public. We hope it will encourage everyone to learn something about the aviation community stationed at Kirtland Air Force Base, New Mexico and the surrounding area. Additional copies are available by contacting the 58 SOW Flight Safety Office (58 SOW/SEF) at:

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Respectfully,
58 SOW Flight Safety

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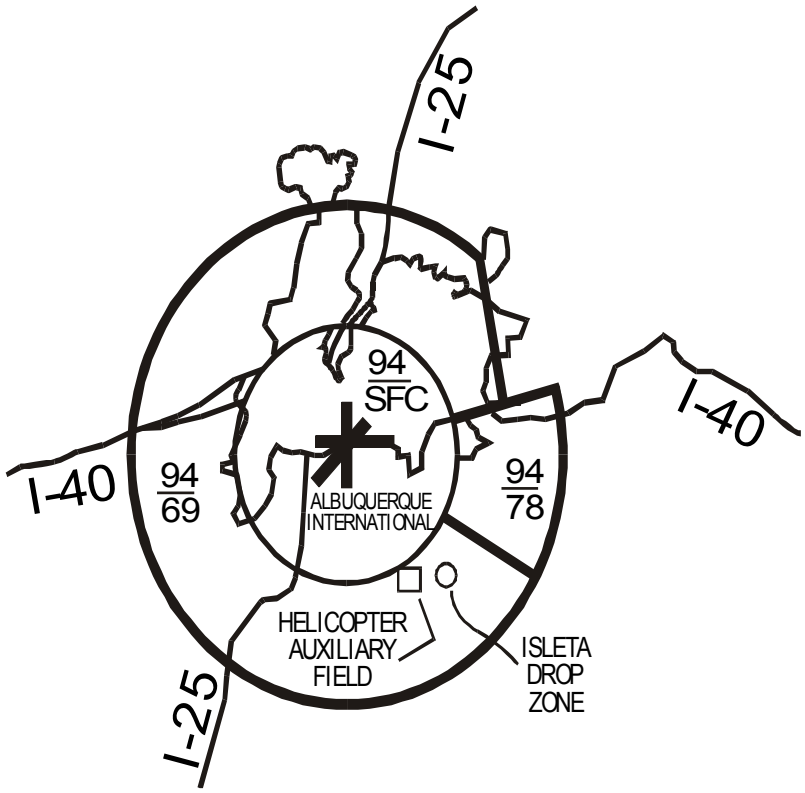
C-130

I. AIRFIELD LOCATION

Kirtland AFB is located on the Albuquerque International Sunport on the southern edge of Albuquerque just east of the Rio Grande River. Aircraft based here include the F-16, MC-130H/P, MH-53, HH-60, and UH-1. Within Albuquerque Class C airspace, the 58 SOW operates a helicopter auxiliary field and the Isleta drop zone used for MC-130 airdrop training. Both are six miles SSE of the airfield.



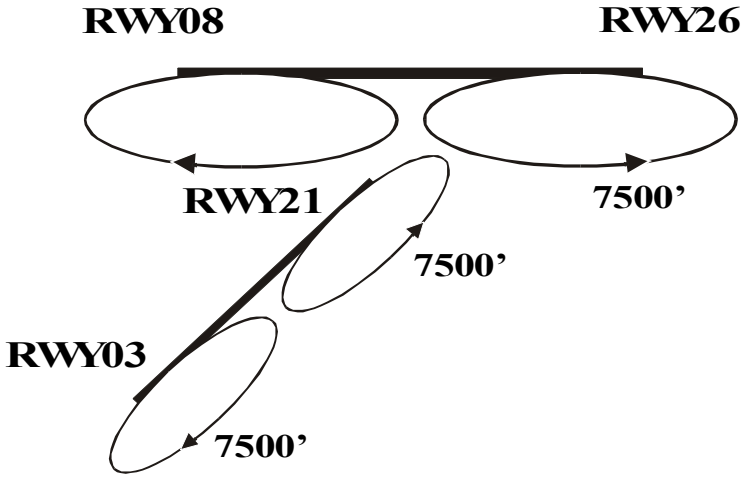
II. AIRFIELD OPERATIONS

AT ALBUQUERQUE INTERNATIONAL AIRPORT

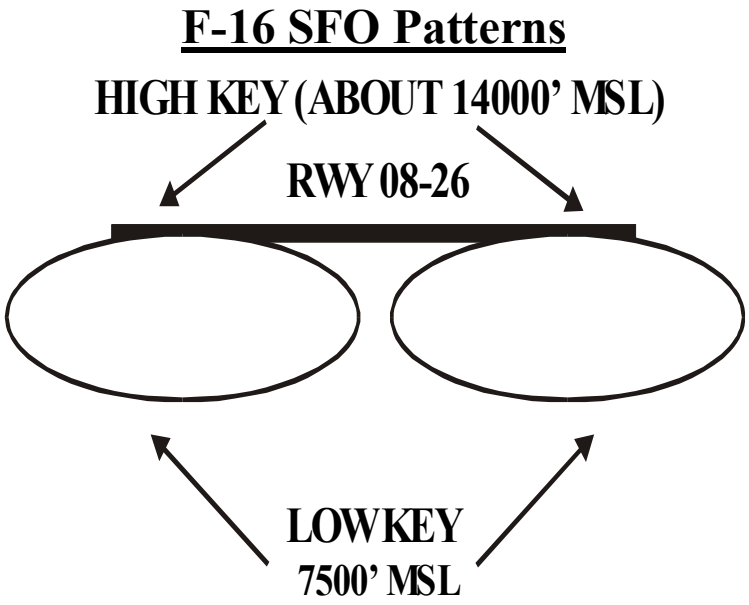
The military aircraft perform unusual pattern work, departures, and arrivals specific to weapon system training requirements. This section will briefly describe some of the training you might see if you fly into Albuquerque International.

F-16 Falcon

F-16s typically use two standard traffic patterns at Albuquerque International Airport. The first is the overhead traffic pattern, which initiates at 7500' MSL and 300 KIAS with the first turn, or "break", to the south. This pattern extends west or east, depending on the runway in question, about one nautical mile before a descending turn to land. Pattern speed on final is 150 – 180 KIAS, depending on landing weight.



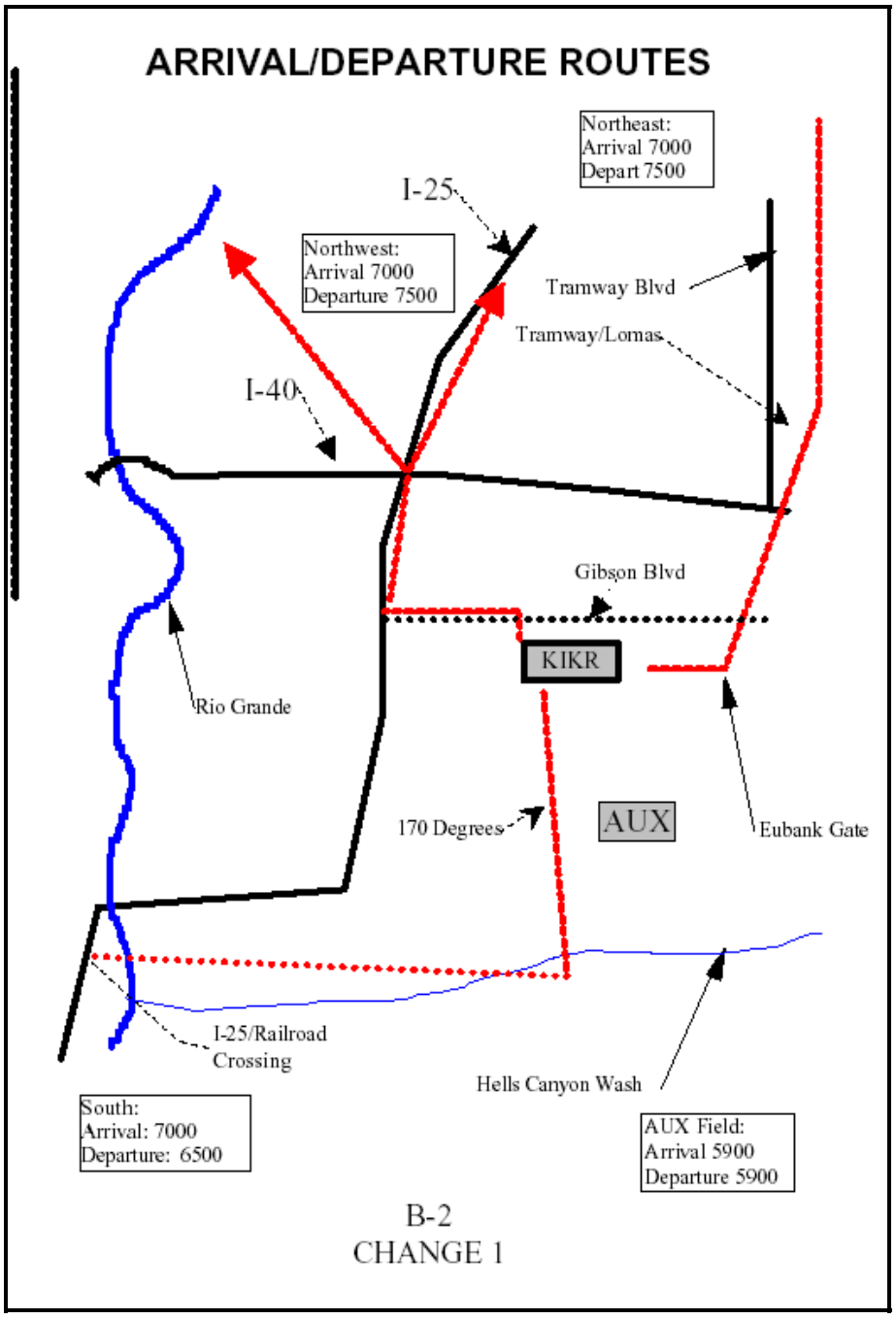
The second type of pattern flown by local F-16s at Albuquerque is the simulated flame out (SFO). This pattern starts at *high key*, which varies from 14,000' – 16,000" MSL and 250 KIAS. The pattern simulates a flamed out approach, and has a very steep descent rate resembling a spiral down to the runway. F-16 aircraft are prohibited from touching down out of an SFO and will perform a go-around.



Helicopters

In order to minimally disrupt the flow of fixed-wing traffic at Albuquerque International, the helicopters arrive and depart along special routes. Our helicopters seldom takeoff or land on runway heading unless they are on an instrument approach. Even on an instrument approach, they will initiate takeoffs and make full stop landings to the helicopter pads north of runway 08-26. The four arrival/departure routes are depicted on the next page.

MH-53 Pave Low


ARRIVAL/DEPARTURE ROUTES
Northeast:
Arrival 7000
Depart 7500
I-25
Northwest:
Arrival 7000
Departure 7500
Tramway Blvd
Tramway/Lomas
I-40
Gibson Blvd
KIKR
Rio Grande
170 Degrees
AUX
Eubank Gate
I-25/Railroad
Crossing
Hells Canyon Wash
South:
Arrival: 7000
Departure: 6500
AUX Field:
Arrival 5900
Departure 5900

MC-130H – Combat Talon II

The MC-130H conducts special operations training between 100'- 500' AGL depending on terrain and type of training involved. Additionally, the MC-130H conducts night vision goggle or blacked-out landings at Albuquerque, Roswell, and Pueblo, CO airports. The MC-130H conducts air refueling with KC-135 and KC-10 aircraft in the vicinity of the GUP 043/047 on AR-674 above 12,000' MSL. It also makes extensive use of the MOAs and other Special Use Airspace for electronic combat and Airborne Intercept training. Electronic Combat training is primarily performed at Melrose range north of Roswell.

MC-130P – Combat Shadow

MC-130P training altitudes depend on the type of training being conducted. Day missions fly 200'-300' AGL modified contour profiles. Night special operations training profiles are 500' AGL modified contour profiles (certain low level legs are flown at 300' AGL). Training airspeeds range from 200 to 240 KIAS. Special operations training often involves multiple aircraft formations (two or three). MC-130P aircraft conduct air refueling operations on AR-117V. The air refueling track is based on the Socorro (ONM) VORTAC. The track starts at the ONM 334/30 DME fix, runs direct to the VORTAC, then south to the ONM 165/20 DME fix. The track is listed in FLIP AP-1B, and consists of the airspace four nautical miles either side of centerline between the two end fixes, and from 7,000' MSL to 7,500' MSL. Refueling speeds vary from 100 KIAS to 120 KIAS. Air refueling operations are also conducted on AR-125V located approximately 20 miles west of AR-117V.

MC-130P and MC-130H

Both aircraft conduct terminal operations at Albuquerque, Pueblo, Double Eagle, Roswell, and Alexander-Belen. For training purposes MC-130 aircraft may enter traffic via a straight-in final from as far out as 10 NM. Airdrop operations occur at Burris Drop Zone (ONM 039/013) and Isleta Drop Zone (ABQ 100/017). Both drop zones have a 5 NM radius NOTAM around them during airdrop operations. Occasionally air drop operations are conducted at Elephant Butte Lake and Cochiti Lake.

III. AIR TRAFFIC CONTROL SERVICES

ALBUQUERQUE APPROACH

The Albuquerque area is Class C airspace, and is centered on Albuquerque International as the primary airport. This airspace is depicted on page one. The inner ring of this airspace extends 5 nautical miles from the airport and the outer ring extends out 10 nautical miles. In addition to the Class C airspace, there is an outer area with a radius of 20 nautical miles. Pilots must establish radio contact with approach control before entering the charted Class C airspace (5/10 nautical miles rings).

Albuquerque's controllers are highly proficient and are invaluable in assisting pilots with traffic separation and issuing traffic advisories. Your aircraft must be transponder equipped to operate within class C airspace. In VFR conditions, keep your visual scan out of the cockpit, clear all the airspace around you and especially in front of you. Maintain situational awareness, squawk the appropriate transponder code, and use these radar services to the maximum extent possible!

The frequencies to contact Albuquerque approach will vary depending on the direction from which you approach the city. These frequencies are depicted on the VFR sectional and indicate arriving aircraft should contact approach control within 20 nautical miles of the Albuquerque International Airport. This insures an appropriate safety margin in case of frequency congestion, allowing you time to attempt contact and stay out of the Class C airspace should difficulties be encountered.

ALBUQUERQUE CENTER

In New Mexico the military operations areas (MOAs) are controlled by Albuquerque Center with the exception of the BRONCO MOAs, which are controlled by Fort Worth. When flying on an IFR flight plan, the controlling agency will only allow you to transit a MOA if traffic conditions permit and IFR separation can be provided between you and aircraft in the MOA. When flying on a VFR flight plan, we **strongly** recommended that you not transit an active MOA. The maneuvers, high speeds, and high closure rates of military aircraft make midair collisions highly probable. Spins, acrobatics, stalls, formation flying and "dog fights" are often performed in these areas, and fast maneuvering aircraft are very difficult to "see and avoid." However, if you decide to transit an active MOA while on a VFR flight plan, please contact the controlling agency for traffic advisories before entering MOA boundaries.

Restricted areas in New Mexico are controlled by Albuquerque Center. There is a big difference between restricted areas and MOAs. A restricted area has been deemed hazardous enough that you are not allowed to enter at all. It doesn't matter if you are VFR or IFR. Once a restricted area is inactive you may transit. If you are in doubt of the status of a restricted area, stay clear. If you want to know the status of a restricted area, call Albuquerque Center and they will inform you of the airspace status.

WARNING: violating restricted airspace will result in FAA legal action against you.

WHERE YOU MIGHT SEE US…

There are three primary MOAs that the 150th Fighter Wing F-16s use. The first is CATO MOA/ATCAA located about 70 NM southwest of Albuquerque. CATO is a very large MOA, at approximately 80 nautical miles in width. The MOA portion of this airspace extends from 13,500' MSL up to and including FL 510. You may want to consider this when planning a VFR flight southwest of Albuquerque. The airspace should be NOTAMed closed, but it's always a good idea to contact Albuquerque Center on the appropriate frequency for advisories regarding this airspace.

The second MOA/ATCAA used by 150th FW F-16s is the PECOS located about 100 NM east-southeast of Albuquerque. This airspace extends eastward approximately 60 NM. Its lower boundary begins at 1500' AGL, and the airspace extends to FL 240. Cannon AFB is the primary user of this airspace but 150 FW aircraft are regular users. The eastern end of the PECOS MOA abuts Melrose Bombing Range, also known as R5104 and R5105. This airspace extends from the ground to FL 180 and sometimes higher (by NOTAM).

The third MOA used is the BEAK MOA/ATCAA located 70 NM southeast of Albuquerque and 20 NM south of the Corona VORTAC. This airspace extends from 12,500' MSL up to FL 290.

R5107 (Melrose Range) is subject to heavy use by many military aircraft, not just F-16's and helicopters. Civil aircraft are forbidden entry to the airspace while it is NOTAMed active. Melrose Range is a very unpleasant place to fly during these times. Trust us, you don't want to fly here.

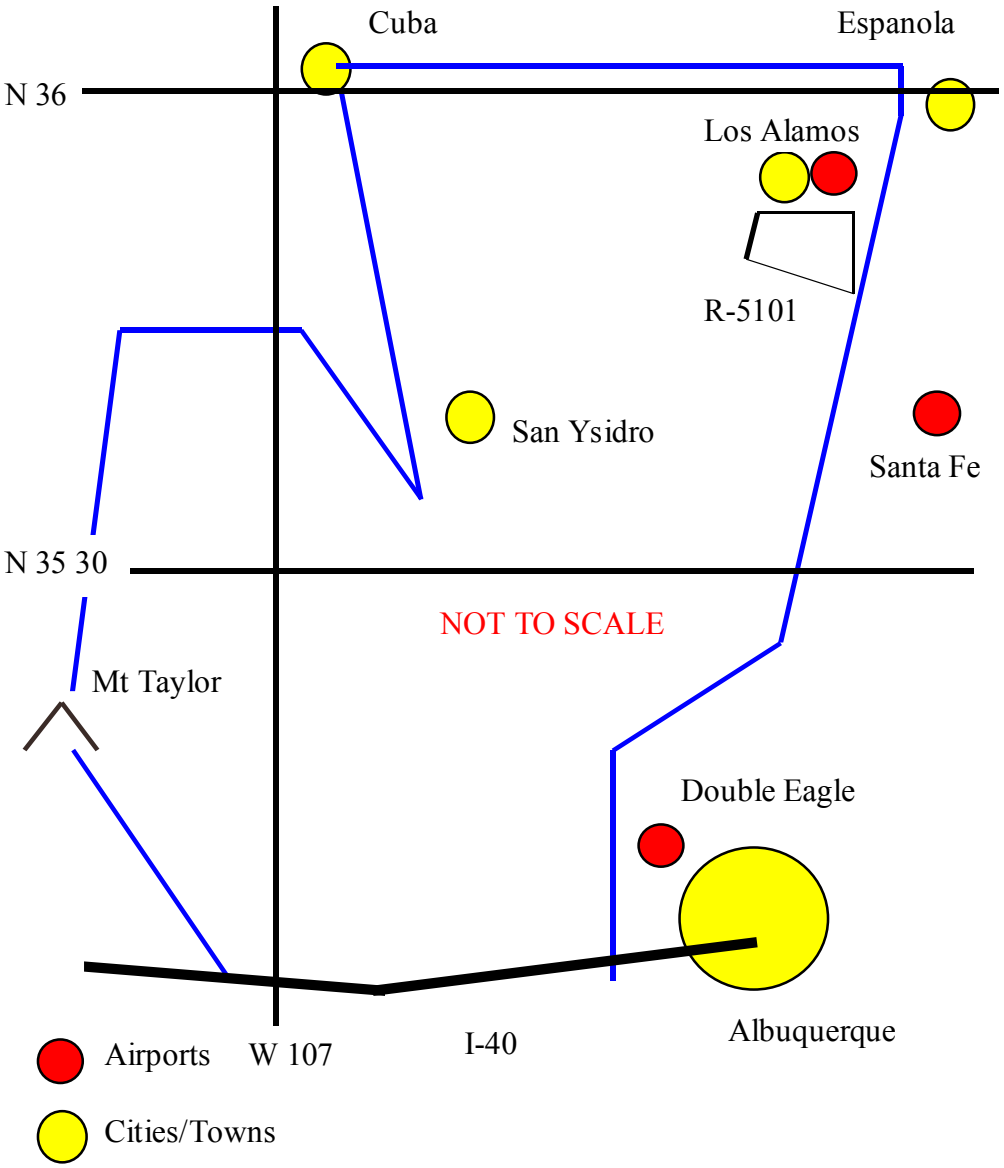
MC-130 aircraft assigned to the 58th Special Operations Wing utilize four areas near Albuquerque International Airport on a regular basis. These areas are: AR117V, Rio Puerco Low Altitude Training and Navigation Area, Isleta DZ, and Burris DZ. More information on these areas is included in this pamphlet.

All 58 SOW helicopters perform day and night operations in the SW and NW Low Altitude Tactical Navigation (LATN) areas at and below 500 feet. They are depicted on the following pages.

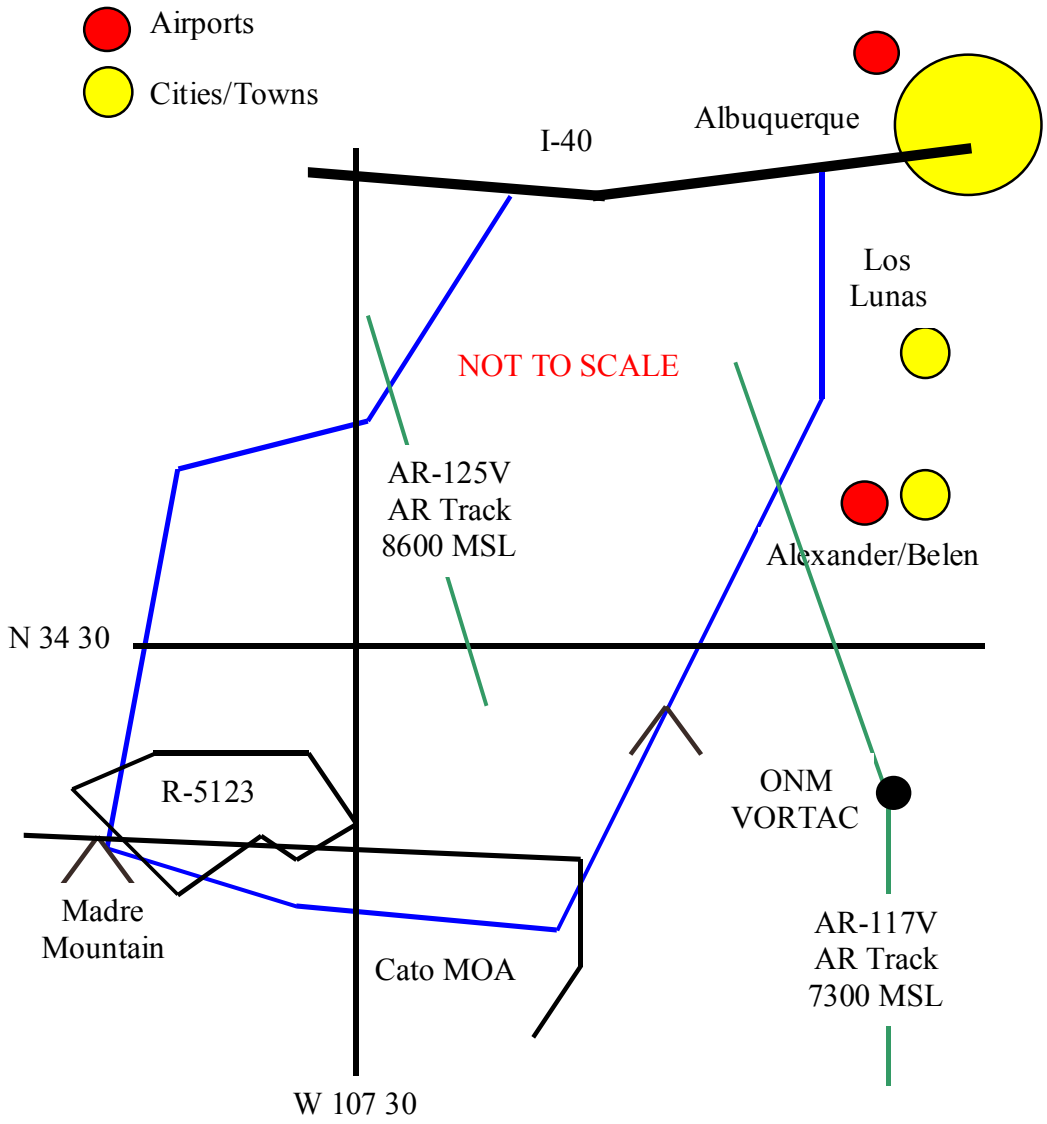
NIGHT MINIMUM EXTERIOR LIGHTS OPERATIONS

All 58 SOW aircraft operate at night with minimum exterior lighting due to their affect on night vision goggle operations. These operations make identification of aircraft more difficult. Most of these operations are at altitudes below 500' AGL.

Northwest Helicopter LATN
(500’ AGL and Below)



Southwest Helicopter LATN
(500’ AGL and Below)



IV. HOW TO AVOID A MIDAIR COLLISION

This chapter is extracted from a FAA pamphlet by the same name. Statistics are geared toward civil aviation. The nature of military aviation contains numerous hazards not encountered by civil aviation and statistically the dangers and circumstances for the military pilot are different. The number one midair hazard for military pilots is the person you brief with across the table.

PROFILE OF MIDAIR COLLISIONS

Studies of midair collisions show definite warning patterns. Nearly all midair collisions occur during daylight and in VFR conditions. Most occur within five miles of the airport, in the areas of greatest traffic concentration, and usually on a warm weekend afternoon when high concentrations of private pilots are flying. Surprisingly, the closing speed, or rate the aircraft converge, is relatively slow. Usually the closure rate is much slower than the speed of either aircraft involved. That is because the majority of inflight collisions are the result of a faster aircraft overtaking and hitting a slower plane.

Approximately 75% of midairs occur below 3000' and half are at or below 500'. The data indicates these collisions occur in the traffic pattern and primarily on final approach. Collisions occurring enroute generally are at or below 8000' and within 25 miles of an airport.

The experience level of pilots involved in midairs varies greatly. There is no way to say whether the inexperienced pilot or the experienced pilot is more likely to be involved in an inflight collision. A beginning pilot has so much to think about he may forget to look around. On the other hand, the older pilot, having been through many hours of boring flight without spotting any hazardous traffic, may grow complacent and forget to scan. No pilot is invulnerable.

CAUSES OF MIDAIRS

There are many causal factors, but the reason most often noted in the statistics read: “Failure of pilot to see other aircraft,” failure of the see-and-avoid system. In most cases, at least one of the pilots involved could have seen the other in time to avoid contact, if proper scanning techniques were utilized.

HOW TO SCAN

There is no perfect scan nor is there one scan best for all pilots. The most important thing is for each pilot to develop a scan that is both comfortable and workable for that pilot in the pilot’s own aircraft.

The best way to start is by getting rid of bad habits. Naturally, no looking out at all is the poorest scan technique, but glancing out every two or three minutes is poor also when you realize that it only takes seconds for a disaster to happen. Check yourself the next time you’re climbing out, making an approach, or just bouncing along over a long cross-country route. See how long you go without looking out the window. Glancing out and giving it the once around without stopping to focus on anything is practically useless; so is staring out into one spot for long periods of time. Learn how to scan properly; first, by knowing where to concentrate your search. It would be preferable to look everywhere constantly but, that not being practical, concentrate on the areas most critical to you at any given time. In the traffic pattern especially, clear yourself before every turn, and clear the area around you before attempting maneuvers.

During the critical final approach stage, don’t forget to look behind and below at least once, and avoid tunnel vision. Pilots often rivet their eyes to the point of touchdown.

In normal flight, you can generally avoid the threat of in-flight collision by scanning an area 60 degrees to the left and right of centerline. Horizontally, the statisticians say, you will be safe if you scan ten degrees up and down from your flight vector. This will allow you to spot any aircraft that is at an altitude that might prove hazardous to your own flight path, whether it’s level with you, below and climbing, or above and descending.

SCAN PATTERNS

Your best protection against in-flight collisions is an efficient scan pattern. Two basic scans that have proved best for most pilots are called the block system. This type of scan is based on the theory that traffic detection can best be made through a series of eye fixations at different points in space.

Each of these fixes becomes the focal point of your field of vision about 10–15 degrees wide. By fixating every 10-15 degrees you should be able to detect any contrasting or moving object. This gives you about 9-12 "blocks" in your scan area, each requiring a minimum of one or two seconds for accommodation.

One method of block scan is the "side-to-side" motion. Start at the far left or right of your visual area and make a methodical sweep in the other direction, pausing in each block to focus. At the end of the scan, return to the panel.

The second form is the "front-to-side" version. Start with a fixation in the center block of your visual field. Move your eyes to the left or right, focusing in each block, then focus quickly back to the center and continue the scan in the other direction.

External scanning is just part of the job. To achieve maximum efficiency in flight, one has to establish a good internal panel scan as well and learn to give each instrument its proper share of time. The amount of time one spends scanning outside the cockpit in relation to what is spent inside depends, to some extent, on the workload inside the cockpit and the density of traffic outside. Generally, the external scan will take about three to four times as long as a look around the instrument panel. A good rule of thumb for your panel scan is five seconds.

Another important safety tip: Traffic on a collision course is hard to see because it does not move across your windscreen. It remains stationary and grows larger.

COLLISION AVOIDANCE CHECKLIST

Collision avoidance involves much more than proper visual scanning techniques. You can be the most conscientious scanner in the world and still have an in-flight collision if you neglect other important factors in the overall see-and-avoid picture. It might be helpful to use a collision avoidance checklist as religiously as you do the pre-takeoff and landing checklists.

Check yourself. Start with a check of your own condition. Your eyesight, and consequently your safety, depends on your mental and physical condition.

Plan ahead. Plan your flight ahead of time. Have charts prepared in proper sequence and within easy reach. Keep the cockpit free of clutter. Be familiar with headings, frequencies, etc., ahead of time; so you can spend minimum time with your head down looking for things.

Clean windows. During your walk around, make sure the windshield is clean and clear of obstructions.

Adhere to SOPs. Follow Standard Operating Procedures and flight regulations, such as correct altitudes and proper pattern practices. Some typical situations involving in-flight mishaps around airports include entering a right-hand pattern with left-hand traffic, or entering downwind so far ahead of the traffic pattern that you interfere with traffic taking off. There are even many pilots who have cut other traffic off upon entering the traffic pattern. In most midairs at least one aircraft involved was not where it was supposed to be.

Avoid crowds. Avoid crowded airspace enroute, like the airspace directly over a navaid. It's better to pass slightly left or right. Pass over airports at a safe altitude and be particularly careful within 25 miles of busy airports and military airfields (Albuquerque International is both).

Compensate for design. Compensate for aircraft design limitations. All aircraft have blind spots, know where they are in your aircraft. An example of a potential midair is a faster low-wing plane overtaking and descending on a high-wing aircraft on final.

Equip for safety. High intensity strobe lights increase your contrast by as much as 10 times day or night. Transponders significantly increase your safety by allowing radar controllers to keep traffic away from you and vice versa. Transponders increase your chances of receiving radar traffic advisories, even on VFR flights. It may not be mandatory to use flight following, but it is prudent.

Talk and Listen. Use your radios, they can be at least as important in providing you with a complete picture of your flight situation as your eyes. When approaching an airport, whether landing or not, call 15 miles out and tell them your position, altitude, and intentions. Also, ask about the local traffic situation. At airports with radar service, call approach. At uncontrolled airfields, call airport traffic advisory service, another FSS frequency, or another appropriate Unicom or tower frequency. A pilot reporting his position to tower is also reporting to you. Listen up.

SCAN! Keep looking where you're going and watch for traffic. Make use of your scan constantly.

HH-60

V. Kirtland Based Aircraft

MH-53

Manufacturer: Sikorsky
Wing Span: 72' 3"
Length: 88' 3"
Weight: 50,000 lbs
Max Speed: 135 KIAS
Pattern Speed: 100 KIAS
Color: Gray
Crew: 6
Range: 600 miles (without air refueling)

58 SOW CALLSIGN: **MOCASSIN**

HH-60

Manufacturer: Sikorsky	Max Speed: 184 KIAS
Wing Span: 53' 7"	Pattern Speed: 100 KIAS
Length: 64' 8"	Color: Green/Gray
Weight: 22,000 lbs	Crew: 4
Range: 445 miles	(without air refueling)

58 SOW CALLSIGN: **GHOST**

UH-1

Manufacturer: Bell
Wing Span: 48’
Length: 57’ 3”
Weight: 10,500 lbs
Range: 300 + miles

Max Speed: 130 KIAS
Pattern Speed: 90 KIAS
Color: Camouflage
Crew: 3

58 SOW CALLSIGN: **SAVE**

MC-130

Manufacturer: Lockheed
Length: 98'9"
Wing Span: 132' 7"
Weight: 155,000 lbs
Range: 4,000 + miles

Color: Gray (MC-130P)
Camouflage (MC-130H)
Speed: 300 mph
Crew: approx. 8

58 SOW CALLSIGN: **SHADOW & AKELA** (MC-130P)
OPUS (MC-130H)

F-16

Manufacturer: Lockheed Martin
Wing Span: 32’
Length: 50’
Weight: 32,000 lbs
Range: 900 miles

Max Speed: 800 KCAS
Pattern Speed: 150-300 KCAS
Color: Gray
Crew: 1

150 FW CALLSIGN: **TACO**